

**REMARKS**

Reconsideration of the July 29, 2002 Official Action is respectfully requested.

Claims 1-20, as amended, and new Claims 21-23 are pending in the application for the Examiner's review and consideration.

Claim 1 has been amended to recite a medium density plasma reactor. Support for this change can be found on page 9, lines 20-page 10, line 6 of the specification. New Claim 21 recites a plasma reactor pressure above 80 mTorr. Support for this claim can be found on page 12, lines 9-11 of the specification. New Claim 22 recites a fluorocarbon reactant supplied to the plasma reactor at a flow rate of 20 to 40 sccm and an oxygen reactant supplied to the plasma reactor at a flow rate of 20 to 40 sccm. Support for this claim can be found on page 11, lines 17-19 of the specification. New Claim 23 recites a capacitively coupled plasma reactor. Support for this claim can be found on page 10, lines 1-6 of the specification. As no new matter has been introduced, the amended and new claims should be entered at this time.

Claim 1 was rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter that was not described in the specification. The reasons for the rejection are given in paragraph 2 on page 2 of the Official Action. This rejection is respectfully traversed. Claim 1, in pertinent part, recites a process for etching a silicon nitride layer with selectivity to an underlying and/or overlying dielectric layer, comprising the steps of introducing a semiconductor substrate into a medium density plasma etching reactor, the semiconductor substrate having a layer of silicon nitride and an underlying and/or overlying dielectric layer. Questions of enablement should be determined when the claim is

considered as a whole, not when its parts are analyzed individually (See MPEP §2164.08).

Furthermore, the test of enablement is whether one reasonably skilled in the art could make or use the invention from the disclosures in the patent coupled with information known in the art without undue experimentation (See *In re Buchner*, 929 F.2d 660,661, 18 USPQ2d 1331, 1332 (Fed Cir. 1991)). Finally, one does not look to the claims but to the specification to find out how to practice the claimed invention (See *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1558, 220 USPQ 303, 316-317 (Fed. Cir. 1983)).

Referring to pages 6-8 of the specification and Figures 2-3, a layer of silicon nitride and an underlying and/or overlying dielectric layer is clearly disclosed. Accordingly, this rejection should be withdrawn.

Claims 1-20 were rejected under 35 U.S.C. § 102(e) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 6,380,096 to Hung ("Hung"). The reasons for the rejection are set forth in numbered paragraphs 3-4 on pages 2-5 of the Official Action. This rejection is respectfully traversed.

In order to establish anticipation under §102(e), all elements of the claim must be found in a single reference. *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 231 USPQ 81, 90 (Fed. Cir. 1986), *cert. denied*, 107 S. Ct. 1606 (1987). In particular, as pointed out by the court in *Gore*, "anticipation requires that each and every element of the claimed invention be disclosed in a prior art reference."

To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *In re Vaeck*, 947 F.2d

488, 20 USPQ2d 1438 (Fed. Cir. 1991). As set forth below, Hung fails to teach or reasonably suggest all of the claim limitations.

Claim 1 recites a process for etching a silicon nitride layer with selectivity to an underlying and/or overlying dielectric layer, comprising the steps of (a) introducing a semiconductor substrate into a medium density plasma etching reactor, the semiconductor substrate having a layer of silicon nitride with an underlying and/or overlying dielectric layer; (b) supplying etching gas to the plasma etching reactor and energizing the etching gas into a plasma state, the etching gas including at least one fluorocarbon reactant and at least one oxygen reactant supplied to the plasma etching reactor at a flow rate ratio of oxygen reactant to fluorocarbon reactant of 1.5 or less, wherein the at least one fluorocarbon reactant comprises  $\text{CH}_3\text{F}$ ; and (c) etching exposed portions of the silicon nitride layer with the plasma so as to etch openings in the silicon nitride layer with the plasma while providing an etch rate selectivity of the etching rate of the silicon nitride layer to the etching rate of the dielectric layer of at least about 5.

In contrast to the claimed process, Hung discloses a *high density* plasma reactor (See abstract). According to Hung, a high density reactor provides both the selectivity and the process flexibility required to satisfy the conflicting requirements of a multi-step process (See column 3, lines 23-41). The process recited in Claim 1 is carried out in a medium density reactor. As is known in the art, the reactant species produced in a medium density reactor differ substantially from the reactant species produced in a high density reactor. Accordingly, because Hung teaches away from using a medium density reactor, Claim 1 and the claims dependent thereon are clearly patentable over Hung.

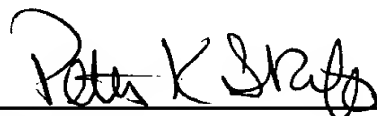
Applicants respectfully submit at least for the reasons discussed above that Claim 1, as well as all the claims dependent therefrom, are clearly patentable over Hung.

It is submitted that the differences between the claimed subject matter and the prior art are such that the claimed subject matter, as a whole, would not have been obvious at the time the invention was made to a person having ordinary skill in the art.

In view of the foregoing, it is submitted that the present application is in condition for allowance and such action is earnestly solicited.

Respectfully submitted,

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**Appendix A - Attachment to Amendment**

**Marked-up Claim 1**

1. (Amended) A process for etching a silicon nitride layer with selectivity to an underlying and/or overlying dielectric layer, comprising the steps of:

introducing a semiconductor substrate into a medium density plasma etching reactor, the semiconductor substrate having a layer of silicon nitride and an underlying and/or overlying dielectric layer;

supplying etching gas to the plasma etching reactor and energizing the etching gas into a plasma state, the etching gas including at least one fluorocarbon reactant and at least one oxygen reactant supplied to the plasma etching reactor at a flow rate ratio of oxygen reactant to fluorocarbon reactant of 1.5 or less;

etching exposed portions of the silicon nitride layer with the plasma so as to etch openings in the silicon nitride layer with the plasma while providing an etch rate selectivity of the etching rate of the silicon nitride layer to the etching rate of the dielectric layer of at least about 5.

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